Remarks

I. Amendments to the Claims

Claims 1, 31, 41 and 65 have been amended, and claims 81-122, 131 and 132 have been canceled. Accordingly, upon entry of this amendment, claims 1-4, 7-34, 37-44, 46-80 and 126-129 will be pending.

Independent claims 1, 31, 41 and 65 have been amended to more particularly claim certain preferred embodiments of the present invention. In particular, claims 1, 41 and 65 are amended to require the pesticidal component to consist of a water-soluble pesticide, and claim 31 is amended to require the pesticidal component to consist of glyphosate predominantly in the form of a salt selected from a Markush group. The pesticidal component of those claims is thereby limited to water-soluble pesticides and the presence of pesticides that are other than water-soluble is excluded. The amendment is supported at page 23, lines 3-6 which describes water-insoluble herbicides as optional components.

Independent claims 1 and 31 are further amended (1) to require one or more cationic surfactants and (2) by cancellation of the word "amine" from the definition of the stabilizer compound. Support for (1) is provided throughout the specification, for instance at page 1, lines 14-16, page 4, lines 10-11, page 6, lines 18-29, and page 16, lines 13-16. Support for (2) is provided at page 20, line 30 to page 22, line 11 of the specification, and in particular the Markush group described at page 22, lines 10-11 which is not limited to amines, but instead lists amine and amide compounds.

Former independent claims 81 and 101, as well as claims 82-100 and 130, and 102-122 and 131, that depend therefrom, are canceled without prejudice.

II. Rejection under 35 U.S.C. §112

The word "amine" has been canceled from the definition of the stabilizer compounds required by the Markush group of claims 1 and 31. Applicants respectfully submit that claims 1 and 31 now meet the requirements under 35 U.S.C. §112.

III. Rejection under 35 U.S.C. §103

Reconsideration is respectfully requested of the rejection of claims 1-4, 7-26, 28-34, 37-44, 46-63, 65-79, 81-102, 105-121 and 126-131 under 35 U.S.C. §103(a) as being obvious in view of the combined teachings of **Jimoh** (U.S. Patent No. 6,369,001), **Wright** et al. (U.S. Patent No. 5,750,468), **Maier** et al. (US 6,667,276) and **Okano** et al. (US 6,030,923).

A. The Cited Art

Jimoh (US 6,369,001) describes a microemulsion formulation comprising a water-soluble herbicide, an oil soluble herbicide, a water-immiscible organic solvent, an emulsification system comprising one or more surfactants each having a tertiary amine functional group, one or more water-soluble chlorides and a dispersing system comprising one or more nonionic surfactants.

The problem solved by **Jimoh** is the formulation of a stable 2-way pesticidal composition comprising a water-soluble pesticide and an oil-soluble graminicide herbicide wherein the water-mediated degradation of the graminicide is minimized. **Jimoh** solves the problem by selecting a water-immiscible solvent in which the graminicide exhibits a partition coefficient significant enough to prevent contact with the water phase, and selecting a surfactant that does not facilitate the transfer of the graminicide across the oil-water interface.

Jimoh describes amine surfactants as preferably being selected from polyoxyethylene (2-20) tertiary alkylamines and alkyletheramines. Quaternary amine surfactants are described as not preferred because they promote oil soluble herbicide degradation (see column 10:33-38). The working examples describe compositions comprising tallow and/or coco amines having 2 to 15 degrees of ethoxylation in combination with nonionic ethoxylated alkyethers such as laurylether having 6 to 8 degrees of ethoxylation.

Jimoh describes low molecular weight (C_{1-6}) organic ammonium chlorides as stabilizers (col 11:48-52), but those compounds must be highly water soluble in order to

prevent oil-soluble herbicide degradation (col 11:25-35). Non-alkoxylated alkylamines having more than 6 carbons (e.g., octylamine) are not described, suggested or exemplified. **Jimoh** exemplifies a benzalkonium chloride stabilizer (Examples 13-17 and 19) and an isopropylamine stabilizer (Example 18), but those formulations were reported as not having -10°C stability as compared to Examples 1 and 3-12 where -10°C stability was achieved by instead using an ammonium chloride stabilizer. It is further noted that a nonionic surfactant (polyoxyethylene (6) or (8) laurylether) was included in each example where -10°C stability was achieved.

Jimoh describes formulations including a water-immiscible organic solvent, but the purpose of that solvent is to prevent degradation of the oil soluble herbicides by water not for low temperature stability. A water-immiscible organic solvent in the absence of a dissolved pesticide is not described, suggested or exemplified.

Therefore, as compared to pending claims 1, 31, 41 and 65, **Jimoh** (1) does not describe a water-immiscible organic solvent in the absence of a dissolved oil-soluble herbicide and (2) describes the use of an organic solvent for oil-soluble herbicide chemical stability, a different purpose than that claimed. Furthermore, as compared to claims 1 and 31, **Jimoh** describes C_{1-6} organic ammonium chloride stabilizers, but does not describe or suggest non-alkoxylated alkylamine stabilizers having more than 6 carbon atoms, such as octylamine. As compared to claims 1, 31 and 45, **Jimoh** demonstrates that -10°C stability is only achieved by including a nonionic surfactant and ammonium chloride in the formulation. As compared to claims 41 and 65, **Jimoh** does not describe a weight ratio of cationic surfactant to stabilizer between about 1.5:1 and 6:1.

Maier (US 6,667,276) describes a formulation comprising an aqueous carrier phase containing a dissolved water-soluble salt of glyphosate, a basic (i.e., cationic) surfactant, an acidic (i.e., anionic) surfactant, and optionally including a water-insoluble herbicide such as oxyfluorfen and an organic solvent. In particular, the purpose of **Maier** is to provide surfactant systems comprising a cationic amine surfactant and an anionic acidic phosphoric acid ester surfactant that is suitable for the preparation of microemulsions.

Maier teaches away from the combination of cationic surfactants in the absence of an anionic phosphate surfactant. Although the pending claims do not exclude the possibility of the presence of an anionic surfactant, anionic surfactants are not required for microemulsion or emulsion formation. Critical to the invention of **Maier** is the surfactant system formed by the interaction of the cationic and anionic surfactants. Suitable cationics are broadly disclosed at column 4:19-57 with non-alkoxylated amines being generally described, while nonionic surfactants are not described or suggested. Combinations of basic surfactants (i.e., amine surfactants) is generally suggested at column 3:52-53, but specific combinations are not described, suggested or exemplified. Moreover, cationic surfactant combinations in the absence of acidic phosphoric ester surfactants (i.e., anionic surfactants) is not described, suggested or exemplified. Table 2, Formula XI, describes a surfactant system consisting of an anionic phosphate ester surfactant and octyl amine, but a second cationic surfactant is not included, a second herbicide is dissolved in the organic phase, and 15.6 wt% of the water-miscible solvent N-methylpyrrolidone is included and therefore suggests that microemulsion formation in glyphosate compositions requires the presence of an anionic surfactant and a water-miscible solvent.

Therefore, as compared to pending claims 1, 31, 41 and 65, **Maier** (1) does not describe or suggest the combination of the claimed cationic surfactant and stabilizer; (2) requires the presence of an anionic alkyl phosphate ester surfactant; (3) does not suggest a water-immiscible solvent in the absence of an oil soluble herbicide as each working example is a 2-way pesticidal composition comprising an oil soluble herbicide and an organic solvent; (4) does not describe or suggest low temperature stability; and (5) the glyphosate working example at Table 2, Formula XI, contains 15.6 wt% N-methylpyrrolidone which is miscible with water in combination with 7.5 wt% Solvesso 200 (aromatic hydrocarbon) which is immiscible with water. As compared to pending claims 41 and 65, **Maier** does not describe or suggest a weight ratio of cationic surfactant to stabilizer. As compared to pending claim 41, **Maier** does not describe or suggest nonionic surfactants.

Okano (US 6,303,923) describes a liquid agricultural chemical composition comprising a water-soluble agricultural chemical, a quaternary dialkoxylated alkyl amine

surfactant and a water-soluble compatibilizer that is an acid salt of a primary, secondary or tertiary alkyl amine. **Okano** teaches that a water soluble compatibilizer is required to prevent the precipitation of a second phase from a single phase aqueous glyphosate solution. **Okano** does not describe, suggest or exemplify such a composition further including a water-immiscible organic solvent or aqueous pesticidal concentrate emulsion or microemulsion. **Okano** makes passing reference to emulsions at column 3:23 but the remainder of the specification and, notably, the working examples fail to describe emulsions, turbid solutions or cloudy solutions. **Okano** does not describe any compositions having a cloud point in excess of 50°C and a crystallization point not greater than about -10°C.

Okano inventive products 1-4, A and C, as reported in table 1 at column 11, describe transparent solutions containing a dissolved glyphosate salt in combination with polyethoxylated ammonium chloride surfactants, a nonionic surfactant such as POE(7) C12 alkyl ether or POE(9) nonyl phenyl ether, and water-soluble compatibilizer salt such as octylamine hydrochloride or dimethyldecylamine hydrochloride, those solutions having -5°C stability. Notably, those solutions exclude the presence of a water-immiscible organic solvent as required by each of the pending claims. Microemulsions have been defined as "a system of water, oil and an amphiphile which is a single optically isotropic and thermodynamically stable liquid solution."[1] Microemulsion formation therefore depends on the presence of an oil phase, which is absent from **Okano**, and one skilled in the art would therefore not consider the transparent solutions reported in table 1 to be emulsions or microemulsions, but instead would be lead to believe those compositions are simply a single aqueous phase solution containing dissolved glyphosate salt. **Okano** therefore does not describe or suggest emulsions or microemulsions, much less that emulsion or microemulsion stability could be achieved as is instantly claimed.

Emulsions or microemulsion cannot even be said to be inherent in **Okano** because of the absence of a water-immiscible organic solvent. Even if, by some means not apparent to one skilled in the art based on the teaching of **Okano**, microemulsions

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[1] quoting I. Danielsson and B. Lindman, *Colloids Surf. A* 1981, 3, 391.

could possibly be said to be inherent in **Okano**, obviousness cannot be predicated on inherency. It is well established that the inherency of an advantage and its obviousness are entirely different questions. That which may be inherent is not necessarily known, and obviousness cannot be predicated on what is unknown.[2] The mere fact that a certain thing may result from a given set of circumstances is not sufficient.[3]

Wright (US 5,750,468) describes glyphosate herbicidal concentrates comprising alkyletheramine surfactants. **Wright** does not describe, suggest or exemplify a water-immiscible organic solvent, an alkylamine stabilizer or compositions that are microemulsions or emulsions.

B. The State of Microemulsion Art

Microemulsion formation depends on the presence of an aqueous carrier phase and a water-immiscible solvent. Microemulsion formation and stability is unpredictably affected by the surfactant system employed and the presence of components such as oil-soluble herbicides, anionic surfactants and nonionic surfactants. Although the formation of microemulsions is obtainable using certain surfactant combinations and finite concentrations of these combinations, formulating herbicide microemulsions is an unpredictable art.

For example, **Maier** (US 6,667,276) describes the field of microemulsion formulation as unpredictable and the microemulsion disclosed therein as specifically limited to the cationic/anionic surfactant system. **Maier**, at column 3:4-18, states:

> "[i]t is...known...that microemulsions are 'critical' systems insofar as they are usually sensitive toward variations in temperature and/or in exchange or in the

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[2] See *In re Shetty*, 566 F.2d 81, 86, 195 U.S.P.Q. 753, 756-57 (C.C.P.A 1977)(quoting *In re Spormann*, 363 F.2d 444, 448, 150 U.S.P.Q. 449, 452 (C.C.P.A. 1966)). See also *In re Naylor*, 369 F.2d 765, 768, 152 U.S.P.Q. 106, 108 (C.C.P.A. 1966) ("[Inherency] is quite immaterial if . . . one of ordinary skill in the art would not appreciate or recognize that inherent result."); *In re Rijckaert,* 9 F.3d 1531, 1533, 28 U.S.P.Q.2d 1955, 1957 (Fed. Cir. 1993).

[3] MPEP §2163.07(a) quoting *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999).

> addition of individual components. In most cases, a modification by addition of other surfactants is not possible, which makes an adaptation of the microemulsions to the active compounds and active compound combinations which are employed in each case or to other application conditions, such as the ratio of the active compounds, temperature variations during storage, climatic zones, etc., more difficult. Hitherto, it is difficult to predict if stable microemulsions can be prepared for an individual case, and in most cases special coordination of all components and ratios is required."

The presence of two herbicides in a system additionally complicates microemulsion formulation and solutions to the problems of those systems are not applicable to systems containing only a water-soluble pesticide. For example, **Jimoh** (US 6,369,001) at column 4:38-48 states:

> "selection of excipient ingredients for preparation of a microemulsion is not straightforward or easy. The difficulty of preparing a stable microemulsion is compounded when the active ingredients to be coformulated are a water-soluble herbicide and an oil-soluble graminicide....Such a combination of active ingredients presents a number of challenges."

Because of the ingredient-related unpredictability associated with microemulsion formation, the skilled artisan would have expected the elimination of the oil-soluble pesticide from the organic phase of **Jimoh** and the elimination of the anionic surfactant from the surfactant system of **Maier** to alter properties such as specific gravity, conductivity, viscosity, electrostatic energy, surface tension, HLB and reactivity of the organic phase and thereby its interaction with the continuous aqueous phase. Such alterations would have been expected to adversely and unpredictably affect the stability of the microemulsion by causing phase separation, flocculation, precipitation, agglomeration and/or separation of the formulation components.

C. References taken in combination

A water-immiscible organic solvent or a water-immiscible organic solvent in the absence of an oil-soluble herbicide is an element missing from each of the references. Because of the ingredient-related unpredictability associated with microemulsion formation, the references taken in combination, would not have provided any motivation

to one skilled in the art to arrive at the instant problem solution embodied in claims 1, 31, 41 and 65. In particular, the skilled artisan would have expected (1) the absence of a water-immiscible organic solvent or (2) an organic solvent containing a oil-soluble pesticide to alter critical properties such as specific gravity, conductivity, viscosity, electrostatic energy, surface tension, HLB, and reactivity of the organic phase and therefore its interaction with the continuous aqueous phase. Such alterations would have been expected to adversely and unpredictably affect the stability of the microemulsion by causing phase separation, flocculation, precipitation, agglomeration and/or separation of the formulation components. Only the applicants have discovered that the claimed stabilizers can be used to form stable emulsions and/or microemulsions in formulations comprising an aqueous phase containing dissolved water-soluble pesticide, a water-immiscible organic solvent and a cationic surfactant as is instantly claimed.

1. Jimoh and Okano

Okano does not overcome the deficiencies of Jimoh

(a) **Okano** does not teach or suggest a water-immiscible organic solvent, emulsions or microemulsions and therefore would not motivate one skilled in the art to eliminate the oil soluble co-herbicide from the **Jimoh** solvent in order to achieve a microemulsion having -10°C stability as required by claims 1, 31 and 41, or 0°C stability as required by claim 65. The express purpose of the **Jimoh** solvent, in combination with a water-soluble chloride stabilizer, is as a vehicle to enable formulation of the oil-soluble co-herbicide.

(b) **Jimoh** teaches that nonionic surfactants are required to achieve -10°C microemulsion stability. **Okano** does not describe or suggest emulsions or microemulsions, much less that -10°C microemulsion stability can be achieved in the absence of a nonionic surfactant; **Okano** simply teaches

that a water soluble compatibilizer is required to prevent the precipitation of a second phase from a single phase aqueous glyphosate solution. **Okano** therefore would not have motivated one skilled in the art to eliminate the nonionic surfactant from **Jimoh** to arrive at the invention of claims 1, 31 or 65.

(c) **Okano** would not have motivated one skilled in the art to eliminate the water soluble chloride stabilizer from **Jimoh** with the expectation of achieving a emulsion or microemulsion having -10°C stability as required by claims 1, 31 and 41, or 0°C stability as required by claim 65. To the contrary, **Jimoh** teaches that a water-soluble inorganic chloride stabilizer is required for microemulsion stability at temperatures below room temperature.

Jimoh does not overcome the deficiencies of Okano

(a) In view of the unpredictability in the art of microemulsion formulation, one skilled in the art would not have been motivated to replace the nonionic surfactant of **Okano** with the water-immiscible organic solvent of **Jimoh** in order to arrive at claims 1, 31, 41 and 65, particularly since the **Jimoh** solvent additionally contains a dissolved oil-soluble pesticide. Surfactants are agents that reduce surface tension or which reduce interfacial tension between two liquids or between a liquid and a solid; solvents are substances capable of dissolving another substance to form a uniformly dispersed mixture at the molecular or ionic size level. Surfactants and solvents therefore serve different purposes and one skilled in the art would not consider them to be interchangeable.

(b) **Jimoh** and **Okano** both teach that nonionic surfactants are required to achieve low temperature stability and one skilled in the art would not have been motivated to combine those references to prepare emulsions or microemulsions not requiring a nonionic surfactant but having -10°C

emulsion or microemulsion stability as required by claims 1 and 31, and having 0°C stability as required by claim 65.

2. **Maier, Jimoh and Okano**

Maier does not overcome the deficiencies of Jimoh and Okano

(a) **Maier** is directed to a surfactant system formed from the combination of a cationic surfactant and an anionic phosphate ester surfactant. A water-immiscible organic solvent is an optional component and is typically included for the formation of an oil phase which serves as the vehicle for oil-soluble co-herbicide incorporation into the microemulsion formed by the interaction of the cationic and anionic surfactants (see columns 6:4-16, 9:47-53, and the microemulsion formulations of Table 2).

(b) **Maier** requires the presence of an anionic surfactant and does not describe or suggest any microemulsion formulation containing a cationic surfactant and a stabilizer as is instantly claimed. One skilled in the art would not have been motivated by **Maier** to (1) add a water-immiscible organic solvent to the **Okano** surfactant system or to eliminate the nonionic surfactant from **Okano**, or (2) eliminate the water soluble chloride stabilizer and the oil-soluble pesticide from the **Jimoh** formulations. Nor would one skilled in the art have had any expectation of success in making those changes.

3. **Maier, Jimoh, Okano and Wright**

Wright does not overcome the deficiencies of **Maier**, **Jimoh** and **Okano**.

Wright describes glyphosate compositions containing tertiary alkyletheramine surfactants falling within the scope of the claimed cationic

stabilizers. **Wright** does not teach, suggest or exemplify emulsions, microemulsions, a water-immiscible organic solvent or the claimed stabilizers. **Wright** simply would not have motivated one skilled in the art to modify **Jimoh**, **Okano** and **Wright** to arrive at the claimed invention.

In view of the above, favorable reconsideration and allowance of all pending claims are respectfully solicited.

Applicants request an extension of time to and including December 9, 2004 for filing a response to the above-mentioned Office action. A check in payment of the application extension fee is enclosed.

The Commissioner is requested to charge any fee deficiency in connection with this response to Deposit Account No. 19-1345.

Respectfully submitted,

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